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13. ABSTRACT ***(Maximum 200 Words)***

This is the first Annual Report of the Strategic Environmental Research and Development Program (SERDP) Scientific Advisory Board (SAB).

The Strategic Environmental Research and Development Program was established by the Secretary of Defense pursuant to the 10 U.S.C. Sec 2901. The Program is intended to identify and develop technology that will enhance the capability of the Department of Defense (DoD) and the Department of Energy (DOE) to meet their environmental obligations. In addition, the Program is intended to provide technology and information that may be useful to other governmental and private organizations in addressing environmental concerns. SERDP is also intended to facilitate the transfer of appropriate technology from the private sector to address DoD and DOE environmental and energy issues.

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STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM (SERDP)

SCIENTIFIC ADVISORY BOARD

FY 1992 ANNUAL REPORT

STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM (SERDP)

SCIENTIFIC ADVISORY BOARD

FY 1992 ANNUAL REPORT

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Introduction

The Strategic Environmental Research and Development Program (SERDP) was established by the Secretary of Defense pursuant to 10 U.S.C. §2901. The program is intended to identify and develop technology that will enhance the capability of the Department of Defense (DoD) and the Department of Energy (DOE) to meet their environmental obligations. In addition, the program is intended to provide technology and information that may be useful to other governmental and private organizations in addressing environmental concerns. SERDP is also intended to provide a vehicle to facilitate the transfer of appropriate technology from the private sector to address DoD and DOE environmental and energy issues.

Specifically, the purposes of the Program are to:

(1) address environmental matters of concern to DoD and DOE through support for basic and applied research and the development technologies that can enhance the capabilities of the departments to meet their environmental obligations.

(2) identify research, technologies, and other information developed by DoD and DOE for national defense purposes, involved in the development of energy technologies and of technologies to address environmental restoration, waste minimization, hazardous waste substitution, and other environmental concerns, and to share such research, technologies and other information with such governmental and private organizations.

(3) furnish other governmental and private organizations with data, enhance collection and analytical capabilities for use by such organizations in the conduct of environmental research.

(4) identify technologies developed by the private sector that are useful to DoD and DOE defense activities concerning environmental restoration, hazardous and solid waste minimization and prevention, and hazardous material substitution, and provide for the use of such technologies in the conduct of such activities.

The SERDP Scientific Advisory Board (SAB) was established pursuant to 10 U.S.C. §2904 and charged with:

(1) the technical review of each proposed research project in excess of $1 million, including the estimated costs for research in, and development of, technologies related to environmental activities and make any appropriate recommendations to the SERDP Council regarding such proposal or project.

(2) making recommendations to the Council regarding technologies, research, projects, programs, activities, and if appropriate, funding within the scope of Strategic Environmental Research and Development Program.

(3) assisting and advising the Council in identifying environmental data and analytical assistance activities within the scope of SERDP.

Objectives

For Fiscal Year 1992, the SERDP Council has slightly modified the Board's charge by directing the Board to review proposed research projects *equal to* or in excess of $1 million, to make recommendations to the SERDP Council regarding the programs reviewed, and to assist and advise the Council in identifying environmental data within the scope of SERDP. Additional responsibilities of the Scientific Advisory Board include providing guidance and advice on other related environmental issues within the scope of SERDP, as requested by the SERDP Council. The SERDP Organization Chart (Figure 1) provides a graphic description of the functional management structure. The Scientific Advisory Board is responsible to provide guidance and recommendations to the SERDP Council on those programs reviewed, however, the Council may accept or reject the recommendations. Furthermore, the SERDP Council retains responsibility for Program strategy development.

Report Requirement

Section 2904(h) of title 10, United States Code, requires that an Annual Report of the Strategic Environmental Research and Development Program Scientific Advisory Board be submitted to Congress not later than March 15 of each year. The Annual Report is required to delineate the actions of the SAB during the preceding year and provide any recommendations, including recommendations on projects, programs, and information exchange, and for additional legislation within the scope of SERDP. This report includes program recommendations made during the SAB meetings of FY 1992.

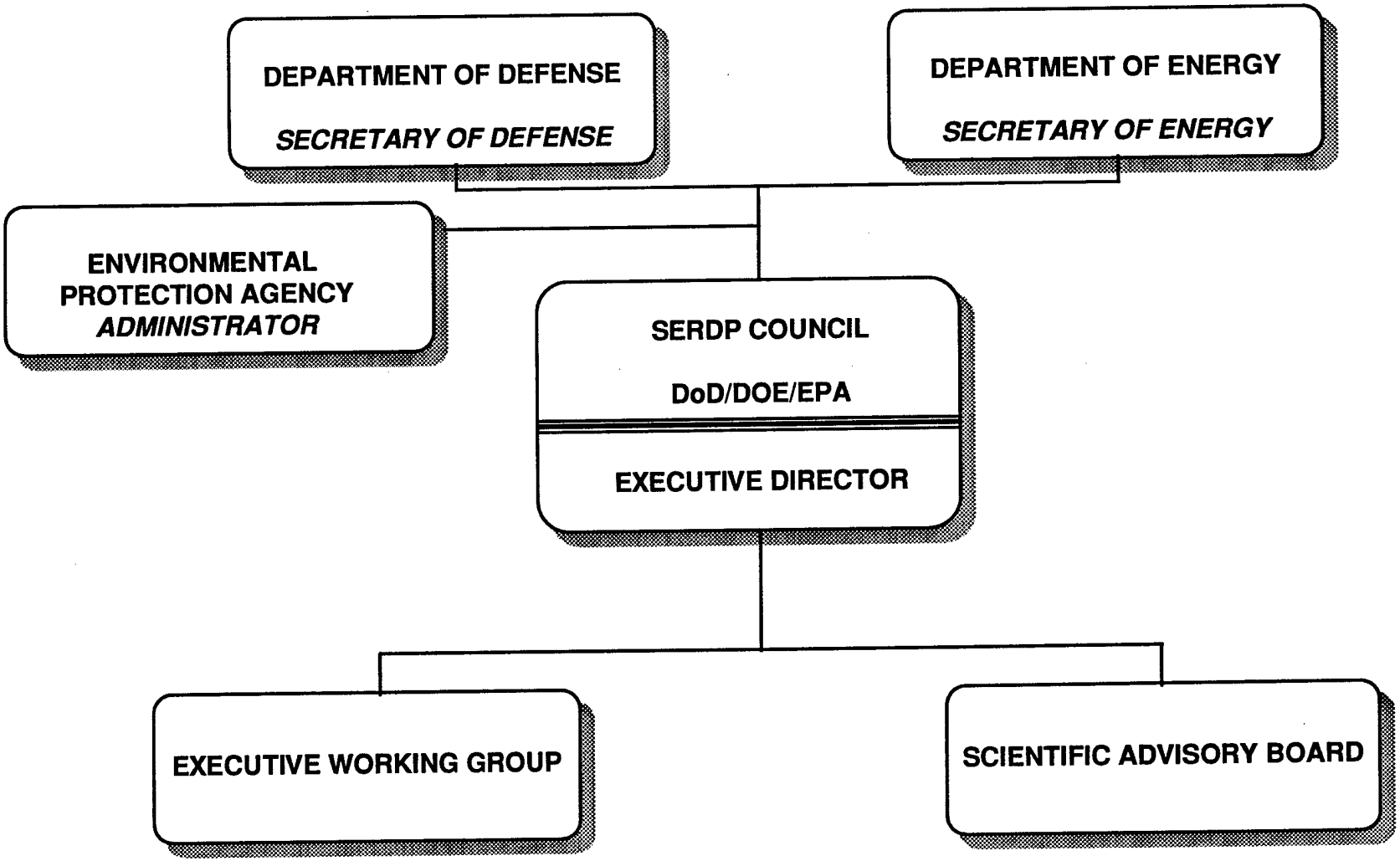
Organization

Membership and terms: Section 2904(a-c) of title 10, United States Code, requires the joint appointment of the members of the Scientific Advisory Board by the Secretary of Defense and the Secretary of Energy, in consultation with the Administrator of EPA. Membership consists of not less than six (6) nor more than fourteen (14) members, appointed for three (3) year terms, with due regard given to equitable representation of scientists and engineers, who are women or who represent minority groups.

The Science Advisor to the President or designee and the Administrator of the National Oceanic and Atmospheric Administration or designee are permanent SAB members. The Heads of the National Academy of Sciences, National Academy of Engineering and Institutes of Medicine have nominated persons for appointment; the Council on Environmental Quality has nominated at least one person representative of environmental public interest; and the National Association of Governors has nominated at least one person representative of interests of State governments.
The initial appointments were made by the Secretaries of Defense and Energy and allow up to half of the members to serve terms of not more than six years and not less than two years, in order to stagger expiration of the terms of the members. There are twelve members of the SERDP Scientific Advisory Board; two permanent members, one member with a six year term, two members with a five year term, one member with a four year term, five members with a three year term and one member with a two year term. Appendix A contains a listing of the FY 92 members of the Scientific Advisory Board. All SAB members complied with 10 U.S.C. §2904(i), which requires the filing of a financial disclosure statement by all members.

FIGURE 1

SERDP ORGANIZATION



Selection of Officials: Dr. Robert B. Oswald of the Department of Defense was appointed by Secretary Cheney to serve as the Executive Director of SERDP. He also assumes the role of the DFO of the Scientific Advisory Board. During Fiscal Year 1992 Dr. Oswald called the meetings, approved the agendas, and attended the meetings of the SERDP Scientific Advisory Board.

Proposal and Project Selection Process

Fiscal Year 1992 was the formative year of both the SERDP program as well as the Scientific Advisory Board. The initial Proposal Development and Acceptance Chart (Figure 2) reflects the process under which the SAB operated and reviewed projects during Fiscal Year 1992. As a procedural issue, the Scientific Advisory Board concurred with a new proposal review process to facilitate the future review and selection of proposals in 1993 (Figure 3).

Section 2904 of title 10, United States Code, authorized the SERDP Scientific Advisory Board to develop procedures for carrying out its responsibilities. Consistent with this authority and in order to evaluate project proposals, effectively and objectively, the Scientific Advisory Board developed Project Proposal Formats and Project Selection Criteria. The understanding of the process, procedures and criteria were essential elements to the SAB's obtaining pertinent information on a particular project in order to make an objective and knowledgeable recommendation to the SERDP Council. Project Proposal Formats and Project Selection Criteria were developed for each DoD Research Category: Basic Research (6.1), Applied Research (6.2), and Technology Demonstration / Technology Transfer (6.3A / 6.3B). To preclude unwarranted duplication of effort, materials requested on each proposal included basic information necessary for responsible program formulation, review and management; including description, objective, approach, applicability to the SERDP goals, potential benefits, and the projects relationship to previous and/or existing environmental efforts within the participating -Agencies' R&D infrastructure.

FIGURE 2

PHASE I
PROPOSAL DEVELOPMENT AND ACCEPTANCE

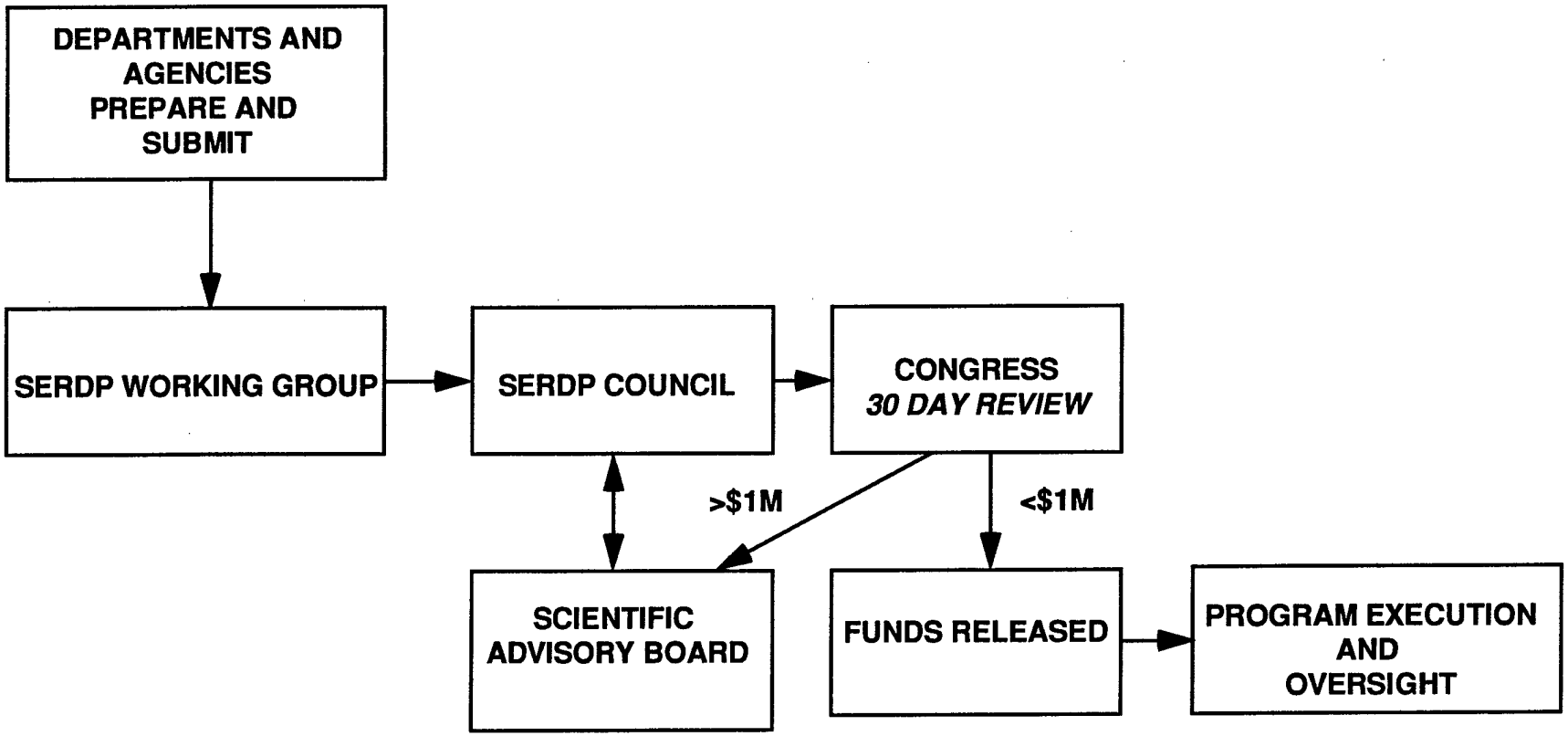
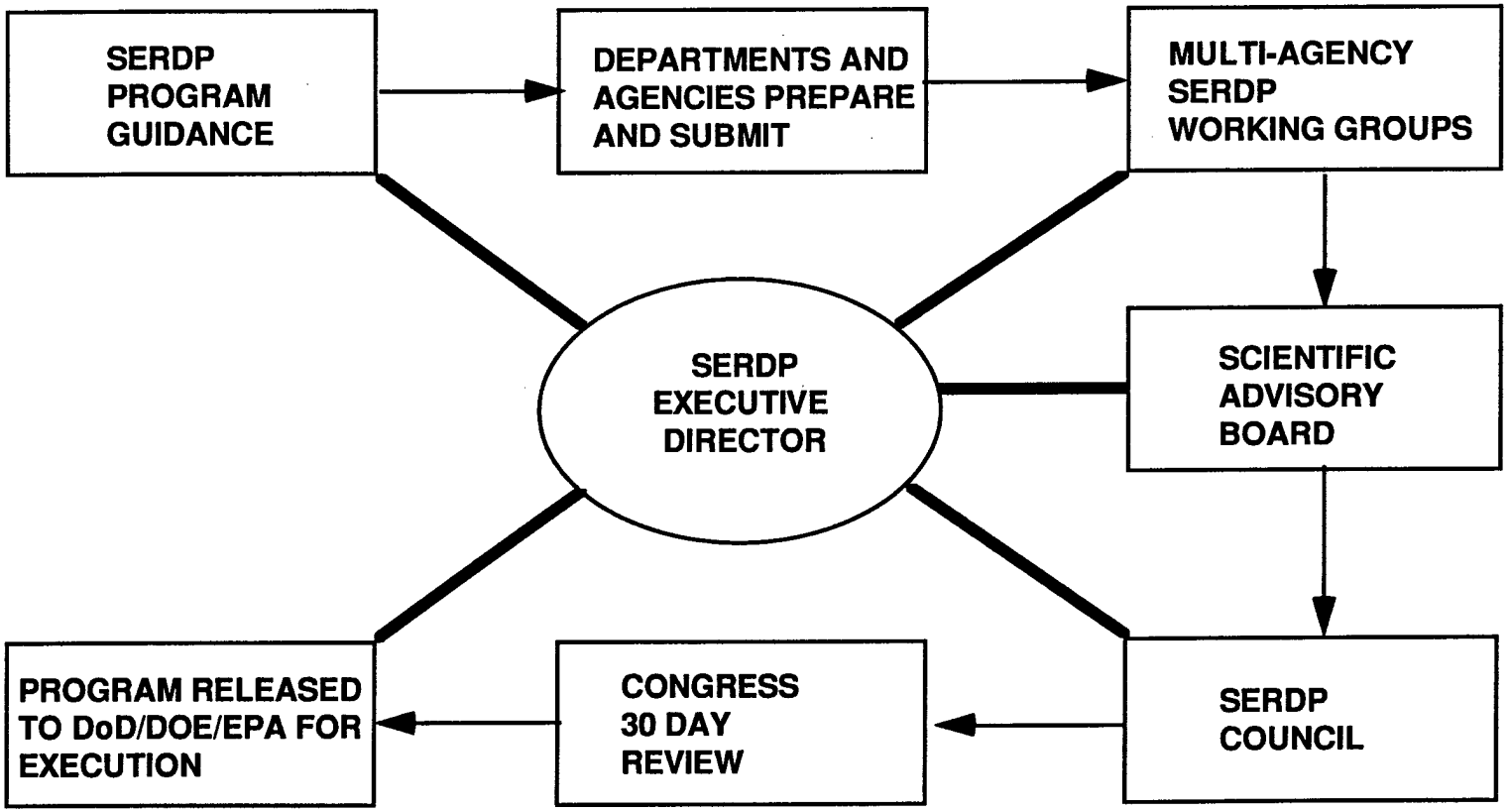


FIGURE 3

PHASE III

PROPOSAL DEVELOPMENT AND APPROVAL PROCESS



SERDP Thrust Areas

The SERDP efforts in FY 91/92 are based upon the need to emphasize the assessment of the state of the global atmospheric and ocean environments; evaluation of the effectiveness of clean-up technologies for hazardous waste materials; the development of approaches to minimize, treat, and dispose of hazardous waste, as well as methods for assessing hazards in existing and restored sites; and alternative and/or clean energy technologies for use on DoD installations. The following specific Fiscal Year 1992 SERDP Thrust Areas, are consistent with these needs.

Remote Sensing projects focus on characterizing the global environment, using advanced technologies for detection, analysis, and evaluation. Advanced surveillance methods are being applied to oceanographic and land characterization. Archival data (both classified and unclassified collected from national assets under the control of DoD and Central Intelligence Agency) and new data will contribute to environmental modeling and analysis. Data include the earth's radiation profile; tropospheric dynamics (chemistry, moisture, and temperature); and variation of trace constituents in the middle and upper atmosphere. Such data, which are critical to long-wave communications for military applications, also can be applied to predicting climatic changes. Efforts are underway to demonstrate the use of acoustics to globally monitor ocean temperatures, using technologies developed by the Navy and Defense Advanced Research Projects Agency. This will provide an important tool to indicate global temperature change and will provide the basis for decisions on implementing a long-term acoustic measurement program.

Installation Restoration and Waste Management projects focus on site cleanup and waste minimization. They are being addressed by demonstrating the most promising technologies, evaluating their effectiveness, and providing specific selection and design criteria to potential users. Reduction in costs and time for restoration are primary considerations. Pollution prevention efforts focus on waste reduction, materials substitution, and process modifications. For remaining waste problems, such as hazardous organic and inorganic chemicals, efforts are directed toward characterization methods for soil and groundwater, as well as means to restore them to environmentally acceptable levels.

Energy, including alternative/clean energy project demonstrations focus on environmentally sound alternative sources to reduce dependence on petroleum-based sources, overall energy consumption, energy costs and "greenhouse effects." Research and technology demonstrations will consist of expanded use of renewable energy resources, such as geothermal, solar photovoltaic, wind and hydropower; innovative, substitute, and alternative energy sources to reduce emissions and fossil fuel consumption; and reduced energy consuming techniques, components and power units/sources that contribute to reduced energy consumption.

Others, including environmental health and other environmental concerns, focus on the development of a reliable, cost-effective environmental management strategy for DoD sites which is being pursued through the development of a scientifically defensible exposure-hazard-risk assessment methodology. Programs addressing DoD long term environmental R&D needs will be identified based upon user requirements and advancing technological capabilities to develop a long term R&D strategy that will guide the DoD into the next century.

Proposal Review and Recommendations

All Phase I proposals listed are described in the Phase I Strategic Investment Plan previously submitted to Congress. The Phase II proposals reviewed are included in this report as Appendix B. All projects and proposals considered by the Scientific Advisory Board during Fiscal Year 1992 are summarized in the following tables. The Projects are reviewed in the following order: SERDP Phase I Proposals, SERDP Phase I & II Interrelated Proposals, SERDP Phase II Proposals. The Proposal Recommendations follow.

Figure 4 - PROPOSALS

THRUST AREA / TITLE	PHASE / AGENCY	RECOMMENDATION
Remote Sensing		
DoD Atmospheric Sensing (Atmospheric Assessment Program (AAP)	Phase I NRL	The Board recommends this project.
DOD Atmospheric Remote Sensing - Global Climate Change	Phase I DOE	The Board recommends this project.
Acoustic Monitoring of Global Ocean Climate	Phase I DARPA	The Board recommends this project and advises planners to be alerted to valuable signals that may be in their "noise" related to monitoring ocean front and mesoscale eddy dynamics.
Definition and Demonstration of Remote Sensing Capability	Phase I DSPO	The Board recommends this project and expresses the need for coordination and cooperation between participating Agencies to effectively derive and disseminate relevant data to the environmental research community. The Board recommends that a SAB subcommittee, requiring clearances, be established to enable a meaningful review of the project's progress and information derived.
Installation Restoration and Waste Management		
Basic Research in Waste Management	Phase I DOE	The Board recommends initial funding with review of outyear budgets before subsequent funding.
Plutonium & Uranium Metal Forming Technologies	Phase I DOE	The Board recommends approval of this project.
Basic Research and Development for Environmental Restoration: Physical, Chemical and Microbial Heterogeneity in the Subsurface	Phase I DOE	The Board does not recommend this project. The Board reaffirms the need for additional research in this area to determine the most appropriate methodology by which to investigate the issues involving the understanding of heterogeneity. Future proposals are welcomed in the future.
Develop & Demonstrate Effective Site Restoration, Pollution Prevention, and Pollution Control Technologies Applicable to Defense-Related Operations	Phase I EPA	The Board recommends funding this project, provided that the research funds are applied to DoD's unique problems.
Nondestructive Decontamination of Chemical Agent Contaminated Structures	Phase I DoD	The Board recommends this project.

Figure 4 - PROPOSALS

THRUST AREA / TITLE	PHASE / AGENCY	RECOMMENDATION
Installation Restoration and Waste Management		
Unexploded Ordnance, (UXO), Detection, Analysis, & Mapping	Phase I DoD	The Board recommends this project. The Board recommends this effort be closely coordinated with ongoing Air Force and private sector nonintrusive detection activities.
Biomonitoring	Phase I DoD	The Board recommends this project.
Analytical Methods/ Instrumentation Development	Phase I DoD	The Board recommends this project.
Toxicology	Phase I DoD	The Board recommends this project. The Board recommends that DoD stay abreast of the latest work in risk assessment and particularly to work on mixtures of pollutants. The Board cautions that the research be appropriate to the talents of the researchers and money available.
HAZMIN Technology - Tactical Vehicle Maintenance Operation	Phase I DoD	The Board recommends this project.
Explosives - Contaminated Soil Slurry Bioreactor Demonstration	Phase II DoD	The Board recommends this project. Additional proposals in this important remediation area are welcome.
Environmentally Safe Disposal of Explosive Wastes	Phase II DOE	The Board recommends this project. The Board recommends participation from a broad-based group of supercritical water scientists located country-wide, including other DOE/DoD personnel. Because of its potential application to DOE former products, DOE should plan to augment funding for this project.
Process Monitoring and Control for Waste Minimization	Phase II DOE	The Board does not recommend this proposal. The Board recommends collaboration with other Agencies and the scientific community already dealing with process monitoring and waste minimization.
Innovative Treatment of Contaminated Groundwater at McClellan Air Force Base (AFB)	Phase II DOE	The Board recommends this project. The Board recommends involvement of U.S. Geological Survey and State Geological groups as well as non-vested consultants on pulsed UV.
Halon 1301 Aviation System Replacement	Phase II DoD	The Board recommends this proposal. The Board suggests consideration be given to a variance on the Executive Order or an exemption for use of Halon 1301 in the current aircraft inventory and recommends Tri-Service cooperation in the development of a replacement for Halon 1301.

Figure 4 - PROPOSALS

THRUST AREA / TITLE	PHASE / AGENCY	RECOMMENDATION
Installation Restoration and Waste Management		
e-Scrub - The Application of Defense Nuclear Agency Pulsed Power to Electron Scrubbing of Flue Gas Remove Unwanted By-Products	Phase II DoD	The Board recommends this project. The Board expects DOE, EPA, EPRI to contribute financially in the near future and assume funding responsibility for the out years. The Board anticipates DoD/DOE/EPA working together in the process and encourages international involvement to foster research in this area.
Energy		
Clean Energy/Conservation - Model Energy Installation Program	Phase I DOE	The Board recommends this project. The Board recommends that this effort be closely coordinated with ongoing EPA and USAF programs in addition to the partners identified in the project description.
Photovoltaics for Military Applications	Phase I DOE	The Board recommends this project and recommends that non-SERDP funds support implementation efforts.
Advanced Technology Assessment and Demonstration of Technologies: Assessment and Deployment of New Technologies in DoD Installations	Phase I DOE	The Board recommends this project.
Solar Detoxification of DoD Explosives in Soils	Phase I DOE	The Board does not recommend funding of this project. The Board recommends a review of the September 1992 Report by the National Academy of Environmental Engineers, and encourages Tri-Agency and industry involvement to achieve a collaborative effort to explore alternative methodologies for chemical and contaminated materials handling. The Board suggests consideration of the solar process for demilitarization of weaponry and welcomes future proposals on this matter.
Wind Energy for Military Applications: Wind Power for Isolated Diesel Installation & Windfarm for Bulk Electricity	Phase I & II Interrelated DOE	The Board recommends these projects. Because of the high capital investment provided to commercial utilities, the Board requests that specific guidance be given to Agencies to ensure milestones and progress are effectively documented.
Other, Environmental Health		
Research to Characterize Environmental and Health Problems Associated	Phase I EPA	The Board recommends this project. The Board wants to ensure that terrestrial aspects be considered in the evaluation process, that coordination exists between the Agencies working in these areas and the need for information sharing through joint studies, peer journals, literature and co-authorship between agencies to minimize duplication of effort.

Summary

Conducted as a tri-agency program with participation by DoD, DOE, and the Environmental Protection Agency (EPA), the SERDP is intended to identify and develop technology that will enhance the capability of DoD and DOE to meet their environmental commitments. In addition, it is intended to provide both technology and information that can be useful to governmental and private organizations in addressing environmental concerns. The SERDP interacts with other environmental programs to identify and contribute to the development of more effective and economical approaches to environmental problems.

The combined efforts of DoD, DOE, and EPA have been guided by the SERDP Council to assure that the SERDP is aggressively and effectively implemented. The efforts to date demonstrate there are opportunities for synergistically exploiting and transferring environmentally related technologies developed by the agencies to each other, and to other government and private organizations.

The Scientific Advisory Board is an active and concerned partner in the effort to enhance the capabilities of the agencies to meet their environmental commitment, to encourage technology transfer and collaborative efforts, and to focus on methods to meet the environmental challenges of the future. The scientific expertise and commitment of the SAB members has, and will continue to contribute to the overall achievement of the SERDP goals.

During Fiscal Year 1993, the SERDP Scientific Advisory Board will continue to assist the SERDP Council to effectively address environmental matters of concern to the Department of Defense (DoD) and the Department of Energy (DOE).

Appendix A - Scientific Advisory Board Membership

Colwell, Rita R.

Current Position: President, Maryland Biotechnology Institute and Director, Center of Marine Biotechnology, University of Maryland.

Degrees: Ph.D., University of Washington.

Previous Positions: Professor of Microbiology, Vice President for Academic Affairs, and Director, Sea Grant College, University of Maryland; Associate Professor of Biology, Georgetown University.

Professional Activities: Chairman, Board of governors, American Academy of Microbiology; Member, National Association of Marine Laboratory Directors; Vice Chairman, Polar Research Board, National Academy of Sciences; Member, Mathematical Sciences Education Board, National Research Council.

Awards: Distinguished Scientist and Lecturer Award, Society for Experimental Biology and Medicine, 1979; Tenth Annual Sea Grant Lecturer and Research Award, MIT, 1982; Fisher Award, American Society for Microbiology, 1985; Gold Medal Award, International Institute of Biotechnology, 1990.

Author or co-author of 14 books, 47 book chapters (since 1984) and 165 articles (since 1983).

Conway, Richard A.

Current Position: Senior Corporate Fellow, Union Carbide Corporation.

Degree: M.S., Environmental Engineering, MIT, 1957.

Previous Positions: Corporate Fellow, Development Associate, Group Leader, and Development Engineer, Union Carbide Corporation.

Professional Activities: Member, National Academy of Engineering; Member, Science Advisory Board, EPA; Member, Committees on Engineering and Technical Systems, National Research Council/National Academies of Sciences and Engineering; Chairman, Hazard Assessment Study Group, International Association on Water Quality.

Awards: Outstanding Leadership Award, ASTM Committee D-34 on Waste Disposal; Award for Personal Achievement in Chemical Engineering, Chemical Engineering, 1986; Dudley Medal, ASTM, 1984; Special Service Award, ASTM Committee D-34, 1983; Rudolfs Award, Water Pollution Control Federation, 1983; State-of-the-Art Civil Engineering Award, American Society of Civil Engineers, 1975; Rudolfs Award, Water Pollution Control Federation, 1974; Hering Award, American Society of Civil Engineers, 1974; Gascoigne Award, Water Pollution Control Federation.

Author or co-author of one book and twenty publications, and editor/co-editor of eight books.

Eno, Amos S.

Current Position: Executive Director, National Fish and Wildlife Foundation, Washington, DC.

Degree: M.A., Cornell University, 1977.

Previous Positions: Director, Conservation Programs, National Fish and Wildlife Foundation; Director, Wildlife Programs, National Audubon Society; Special Assistant to the Chief, Office of Endangered Species, U.S. Fish and Wildlife Service.

Professional Activities: Consultant/Production assistant to National Audubon Society's TV specials and to WTBS for wildlife films; Consultant to President's Commission for Americans Outdoors;

Author of FY89-93 (annual) Federal Agency Needs Assessments, four Audubon Wildlife Reports, and Crossroads: Environmental Priorities for the Future; co-author, Wolf Recovery in the Northern Rocky Mountains.

Gade, Mary A.

Current Position: Director, Illinois Environmental Protection Agency.

Degree: LLD, Washington University School of Law.

Previous Positions: Deputy Assistant Administrator for Solid Waste and Emergency Response, EPA; Associate Division Director, Branch Chief and Staff Attorney for Superfund, EPA Region 7.

Professional Activities: Instructor, Roosevelt University; Membership on various EPA workgroups and task forces.

Published an article, "Hazardous Waste Management in Developing Countries", 1987.

Jahn, Laurence R.

Current Position: Chairman, SERDP Scientific Advisory Board.

Degree: Ph.D., Wildlife Ecology and Management, University of Wisconsin.

Previous Positions: Past Board Chairman, United Conservation Alliance; Board Chairman; President; Vice-President; Director of Conservation, Wildlife Management Institute. Wildlife Research Biologist, Wisconsin Dept. of Natural Resources.

Professional Activities: Chairman, Natural Resources Council of America; Secretary-Treasurer, North American Wildlife Foundation; Secretary, Wildfowl Foundation; Member and Chairman, National Watershed Coalition; Chairman, U.S. Implementation Board for the North American Waterfowl Management Plan; Chairman, Chief of Engineers' Environmental Advisory Board.

Awards: Aldo Leopold Medal, Wildlife Society; Barbara Swain Medal, Natural Resources Council of America.

Authored numerous papers and reports, assisted editing and publishing a number of award-winning books on wildlife ecology and management.

Moss, Marvin K.

Current Position: Associate Vice-Chancellor for Marine Sciences, University of California, San Diego, and Deputy Director, Scripps Institution of Oceanography.

Degree: Ph.D., Physics, North Carolina State University, 1961.

Previous Positions: Director, Office of Naval Research; Associate Director, Office of Energy Research, DoE; Director, Nuclear Division, U.S. Arms Control and Disarmament Agency; Professor of Physics, North Carolina State University.

Awards: Outstanding Performance Ratings, SES V, 1979-1987; Presidential Rank Meritorious Government Executive, 1985; U.S. Navy Distinguished Civilian Service Award, 1987.

Parker, Frank Leon

Current Position: Distinguished Professor of Environmental and Water Resources Engineering, Vanderbilt University.

Degree: Ph.D., Harvard University, 1955.

Previous Positions: Professor of Management of Technology, Vanderbilt University; Senior Research Associate, Vanderbilt Institute of Public Policy Studies;

Professional Activities: Chairman, Environmental Advisory Committee, Pennsylvania Power and Light Company; Chairman, Board of Radioactive Waste Management, National Academy of Sciences (NRC); Leader, National Academy of Sciences Delegation to the Soviet Union on Cooperation in Radioactive Research and Management.

Awards: The Alexander Heard Distinguished Service Professor, 1988-89, and appointment as a Senior Research Fellow, The Beijer Institute, The Royal Swedish Academy of Sciences, 1984-1987.

Co-author of three books, co-editor of two books, author or co-author of 25 book chapters and 40 journal articles.

Raven, Peter H.

Current Position: Director, Missouri Botanical Gardens; Professor of Botany, Washington University; Adjunct Professor of Biology, St. Louis University and University of Missouri-St. Louis.

Degree: Ph.D., UCLA, 1960.

Previous Positions: Senior Research Fellow, New Zealand Department of Scientific and Industrial Research; Associate Professor, Stanford University; Taxonomist and Curator, Rancho Santa Ana Botanic Garden, Claremont, CA; NSF Postdoctoral Fellow, British Museum (Natural History).

Professional Activities: President, International Organization of Plant Biosystematics; Member of Editorial or Advisory Boards for sixteen professional journals; Member, Scientific Advisory Board, National Tropical Botanical Garden; Council member, International Association for Plant Taxonomy; Member, Committee on Research and Exploration, National Geographic Society; Member, Chairman's Council, Conservation International; Member, National Council, World Wildlife Fund and Conservation Foundation.

Awards: Honorary D.Sc. degrees from eight U.S. and foreign universities, 1982-1990; Honorary D.Hum., Webster University, 1989; Award of Merit, Botanical Society of America, 1977; Distinguished Service Award, American Institute of Biological Sciences, 1981; International Environmental Leadership Medal, United Nations Environmental Program, 1982; International Prize for Biology, Government of Japan, 1986; Honor Roll of Global 500, United Nations Environmental Program, 1987; National Conservation Achievement Award, National Wildlife Federation, 1989.

Co-author, editor or co-editor of nine books and nine other publications since 1985.

Ryan, Michael J.

Current Position: Senior Vice President, Metcalf & Eddy Incorporated.

Degree: Ph.D., Environmental Engineering, University of North Carolina, 1975.

Previous Positions: Executive Vice-President, ICF Technology Inc.; Program Director of various ICF programs; Chief of Environmental Policy, USAF; Director of Environmental Engineering and Industrial Hygiene, Strategic Air Command HQ.

Professional Activities: Consultant to the USAF Surgeon General; Member, USAF Engineering and Services "Future Vision" Panel; Professional Engineer (Texas); Board Certified Industrial Hygienist.

Author or co-author of nine articles or other publications since 1985.

Weber, Walter J., Jr.

Current Position: Chairman, University Program in Water Resources and Director, Great Lakes and Mid-Atlantic Hazardous Substance Research Center, University of Michigan.

Degree: Ph.D., Water Resources Engineering, Harvard University, 1962.

Previous Positions: Visiting Professor, University of California at Berkeley and University of Melbourne, Australia, 1971; Post-Doctoral Fellow, Harvard University, 1962-1963.

Professional Activities: Member, National Academy of Engineering, National Society of Professional Engineers, American Academy of Environmental Engineers, American Chemical Society, American Institute of Chemical Engineers, American Society of Civil Engineers (Fellow); Advisory Board, Journal of Environmental Science and Technology; Editorial Board, Journal of Contaminant Hydrology; Board of Environmental Studies and Toxicology, NRC.

Awards: Distinguished College Professor, University of Michigan, 1987; Stephen S. Atwood Award for Engineering Excellence, University of Michigan, 1987; Distinguished Faculty Award, State of Michigan, 1989; Distinguished Scientist Award, EPA, 1991.

Author or co-author of 42 publications since 1985.

Scientific Advisory Board Membership
Permanent Membership

Maynard, Nancy G. **Represents Science Advisor to the President**

Current Position: Assistant Director for the Environment, Office of Science and Technology Policy, Executive Office of the President.

Degrees: Ph.D., Biological Oceanography, University of Miami, Florida, 1974.

Previous Positions: Associate Chief for Research, Laboratory for Oceans, NASA/Goddard Space Flight Center; Branch Head, Oceans and Ice Branch, NASA/Goddard Space Flight Center; Resident Research Associate, National Research Council (NASA), Jet Propulsion Laboratory, California Institute of Technology; Research Associate, Visibility Laboratory, Scripps Institution of Oceanography, University of California; Staff Director, Board on Ocean Science & Policy, National Academy of Sciences; Policy Analyst, Executive Office of the President, Office of Science and Technology Policy, Department of Commerce, Science and Technology Fellow; Oil Spills Scientific Support Coordinator, National Oceanic and Atmospheric Administration.

Professional Activities: American Association for the Advancement of Science, The Oceanography Society, American Geophysical Union, Association for Women in Science, Member, Board of Directors for the Women's Aquatic Network, Member, Corporation of Bermuda Biological Station for Research.

Awards: Certificate of Recognition from National Oceanic and Atmospheric Administration, IXTOC I Oil Spill; Unit Citation from National Oceanic and Atmospheric Administration, Campeche Oil Spill; Public Service Commendation from U.S. Coast Guard, Alaska Oil Spill Response.

Author or co-author of more than 20 chapters or scientific journal articles.

Ostenso, Ned A. **Represents Administrator, NOAA**

Current Position: Assistant Administrator for Oceanic and Atmospheric Research and Chief Scientist, National Oceanic and Atmospheric Administration (NOAA).

Degrees: Ph.D., University of Wisconsin, 1962.

Previous Positions: Deputy Assistant Administrator for Research and Development and Director of the National Sea Grant College Program; Deputy Director and Senior Oceanographer of the Ocean Science and Technology Division, Office of Naval Research; Assistant Presidential Science Advisor in the Office of Science and Technology of the Executive Office; Faculty, University of Wisconsin, Department of Geology and Geophysics.

Professional Activities: Member of numerous scientific professional associations and advisory committees; Johns Hopkins School for Advanced International Studies; American Political Science Association Fellow in the U.S. Senate and U.S. House of Representatives, where he developed the National Earthquake Hazard Reduction and National Climate Program Acts; Woods Hole Oceanographic Institution; the Lamont-Doherty Geological Observatory of Columbia University; the Arctic Institute of North America.

Awards: Meritorious Service Award from the Department of Defense, the Navy Department, and the National Academy of Sciences; Mountain in Antarctica and a seamount in the Arctic Ocean named after him.

Author of over 50 published scientific research papers.

RESEARCH TITLE: EXPLOSIVES SLURRY BIOREACTOR DEMONSTRATION

OBJECTIVE: To develop and demonstrate a soil slurry bioreactor process for the remediation of soils contaminated with explosives.

PROBLEM ADDRESSED: A number of U.S. Army installations have sites with explosives-contaminated soils and sediments. Although incineration has been demonstrated as an effective treatment technology, the treatment costs are high. Composting is an innovative, alternative technology to incineration, however, due to soil composition, composting may not be applicable to all sites. Although the process of using a soil slurry bioreactor to treat explosives-contaminated soils has not been developed or demonstrated, it is routinely considered as a potential remediation technology.

BENEFITS: The use of a soil slurry bioreactor offers a remediation technology for the treatment of explosives contaminated soils which has the potential to be more cost effective than composting. In addition, the use of the soil slurry bioreactor used in conjunction with the right microbial consortia, called bioaugmentation, has the potential to mineralize the explosive contaminants. The residual material could be readily revegetated as part of the site restoration effort.

ACCOMPLISHMENTS TO DATE: Impressive laboratory and bench scale results have allowed the advancement of this technology and additional funds are required to accelerate a field demonstration of this technology. A feasibility study conducted with soils contaminated explosives from Joliet Army Ammunition Plant (JAAP) indicated that a soil slurry-sequencing batch reactor (SS-SBR) has the potential to degrade explosives to acceptable levels at significantly lower costs. Several site remediation feasibility studies are currently considering the use of this technology to treat explosives-contaminated soils. In addition, several government laboratories, Universities and commercial sources have claimed to have isolated microbial consortiums capable of mineralizing explosives which have potential application to this technology. A test plan and safety plan has been developed for a pilot scale demonstration at Joliet Army Ammunition Plant and regulatory approval for this demonstration is expected by April 1992.

FUTURE PLANS/MILESTONES:

-	Initiate Pilot Scale Demonstration by JAAP	May 92
-	Begin adaptation of JAAP consortium	Jul 92
-	Begin SSBR tests	Sep 92
-	Complete SSBR tests	Dec 92
-	Final Report	Mar 93

AVAILABLE DOCUMENTATION:

Final Report, **Feasibility of Biodegrading TNT-Contaminated Soils in a Slurry Reactor,** U.S. Army Report CETHA-TE-CR-90062, June 1990.

FUNDING REQUIRED: FY92 $1 Million

RESEARCH ACTIVITY: U.S. Army Toxic and Hazardous Materials Agency, ATTN: Captain Kevin Keehan, Aberdeen Proving Ground, MD, 21010-5401, (410) 671-2054.

PROJECT: ENVIRONMENTALLY SAFE DISPOSAL OF EXPLOSIVE WASTES

OBJECTIVE: The purpose of this program is to develop and qualify environmentally safe processes for disposal of explosive wastes in the DOE Nuclear Weapons Complex (NWC). Arms control treaties and stockpile improvements are increasing explosive waste disposal requirements in the NWC and governmental regulations are precluding present means of disposal. In the program proposed here, candidate technologies for disposal of explosives will be investigated and recommendations will be made for promoting technologies by pilot plant operation.

APPROACH: This program is the first phase in the ultimate goal of developing a zero-waste system for high-explosives.

The Pantex plant operations will be seriously impacted by a lack of environmentally acceptable processes for the disposal of high explosives (HE) and related wastes from process streams. In the past, the U.S. has used open-pit burning for dry HE treatment and "ponding" for HE contaminated waste streams. Open-pit burning of HE, however, is being banned in several states and this ban may eventually extend to Texas, where Pantex is located. Also, states have begun to ban "ponding." The DOE has no alternative process for minimizing or destroying their HE waste in an environmentally acceptable manner.

Three distinct HE waste streams are generated at the Pantex Plant:

- large solid pieces generated from reject parts, mechanical property specimens, and stockpile-life test parts;
- contaminated rags, clothing, test equipment, etc.; and
- liquid waste from machining fluids, vacuum pump oil, formulation solvents, cleaning fluids, etc.

The DOE has two very important HE concerns that must be addressed immediately. An environmentally safe process for recycling HE from site returns and a total recycling capability for insensitive high explosives and for disposal of non-recyclable HE. The former task is near term, but the technology is being developed for the long term use as well. Most of the site returns for the next several years contain conventional plastic-bonded high-explosives (CPBX). The CPBX's have never been recycled in the U.S. Recycled CPBX, however, may have use in the DOD and possibly industry.

A single process probably will not be adequate for HE site return treatment. It probably will take a combination of three to five different technologies. Several must be investigated because none is mature. Some of these include:

- recycling the CPBX;
- nonconventional machining to remove the CPBX from the pit--either water jet, oil jet, supercritical carbon dioxide, or solvent extraction;
- either closed loop incineration, plasma arc, or microwave treatment to destroy bulk explosives;
- treatment of slurries to destroy HE--supercritical water oxidation, subcritical media destruction, ultraviolet-light hydrogen-peroxide oxidation, pyrolysis, or molten salt oxidation;
- off-gas treatment using pyrolysis or pulsed plasma processing; and
- waste-water purification via filtration through activated charcoal, wier clarification, in

combination with biodegradation.

Experts in each technology will evaluate emerging technologies. A peer-select panel will select the most promising technologies. Laboratory experiments in the selected technologies will be performed to validate parameters and establish requirements for the design and construction of pilot/demonstration process systems.

BENEFITS: The main benefit of this program is to provide alternative technologies for environmentally qualified and safe processes for disposal of high explosives waste in the DOE Nuclear Weapon Complex instead of open-pit outdoor burning. All of the technologies that DOE develops for its HE, either main charge or components containing internal HE, will be of use to DOD.

PARTNERS AND RELATED ACTIVITIES: In view of the mutual interest of the DOD and the DOE in the disposal of HE, we propose an equal cost sharing for this proposal. We welcome DOD participation in this activity. DOE proposes to use $1.8 million of DSRP funding for this activity, with the remaining $1.8 million funding from DOD.

MILESTONES:

FY92 Report recommending state-of-the-art HE disposal and recycling technologies for further development and establishing paramenters to be validated.

FY93 Complete the laboratory experimental investigation of the selected technologies for follow-on demonstrations directed toward production.

The funds for the pilot facility and/or demonstration facility will be from other sources.

FUNDING:

FY 1992 $1.70M

RESEARCH ACTIVITY:

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RESEARCH TITLE: PROCESS MONITORING AND CONTROL FOR WASTE MINIMIZATION

OBJECTIVE: The purpose of this proposal is to develop the necessary instrumentation for real-time monitoring of manufacturing and chemical processing of uranium and plutonium for waste minimization, process control, material accountability, and waste-stream contaminant compliance.

APPROACH: Analytical instrumentation capable of providing real-time monitoring of chemical and fabrication processes is crucial. Applications of monitoring and analytical techniques such as on-line visible spectroscopic analysis, remote sensors for continuous quantitative measurements, fiber-optic base sensors for waste-stream monitoring, and radiation sensors for material accountability will provide the means to monitor the feed, production process, and waste materials in solid, liquid, or gas states.

Instrumentation and control can use either state-of-the-art devices or modern, advanced instrumentation. Many of the instruments must be rugged and be able to work in an industrial line. Accordingly, the program will 1) apply available new sensor technologies to uranium and plutonium, 2) assess the capability of new concepts for on-line sensors to monitor a particular process, and 3) develop and refine statistical data analysis methodology as related to process monitoring, materials and waste assay, and process control.

One important method to minimize and/or eliminate waste is to address the problem at its source, i.e., in fabrication or recovery as well as monitor and analyze the waste stream. To do this is a three-level approach will be used in the development of this technology base.

- At-line instruments, located adjacent to the processing lines to provide near-real time (less than two hours) information about impurities, acid concentrations (automated titration) and radioactive measurements to quantify concentrations.

- On-line measurements make use of commercially available instrumentation and advanced data analysis techniques. On-line instruments, located directly parallel with the chemical or fabrication processes, provide instantaneous information about chemical oxidation states, metal impurity analysis, and actinide-specific sensors for measuring acid concentrations, metal species, and surface contaminants.

- The third method is based on compact chemistry specific sensor developments. It allows the monitoring of process or waste streams remotely to ensure compliance with discard limits and contaminant release levels. This is accomplished through the use of polymer-specific coatings applied directly to fiber optic cables that record chemical changes in the presence of the contaminant selected for analysis.

This program will be conducted jointly among LANL, LLNL, SNL, and the Oak Ridge Y-12 Plant. Experts in instrumentation and materials processing will assess the broad range of all possible instruments and methods, and they will establish criteria for designing new instruments to achieve the maximum advancement in miniaturization, ruggedness, simplicity, environment insensitivity, automation, and integration for process-control capabilities. This innovative and integrated approach will be applicable to a wide range of materials processes, including energetic materials, uranium, and weapons components for military applications.

BENEFITS: New instrumentation for continuous monitoring of waste-stream effluents from chemical processing and residue recovery is required to be in compliance with the current environmental control regulations. The same or similar instrumentation is also required to comply with new goals in waste minimization. With at-line and on-line instrumentation, process improvements can be realized through minimizing addition of chemical reagents, characterizing the process streams, minimize the volume of liquid wastes, and minimizing the reworking of out-of-spec products. Automated analysis will permit minimizing recycle requirements and process waste.

MILESTONES:

- Report on the evaluation, prioritization, and recommendations of the process lines and waste streams to be studied for monitoring and control	FY92
- Report on the analysis and characterization of selected waste streams	FY92
- Develop analytical procedures for at-line and on-line instrumentation for monitoring and controlling the process to minimize waste	FY93
- Recommend instrumentation and software for pilot-scale demonstration	FY93

FUNDING ($M):

FY92	$2.50M

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PROJECT: INNOVATIVE TREATMENT OF CONTAMINATED GROUNDWATER AT MCCLELLAN AIR FORCE BASE (AFB), DAVIS, CALIFORNIA

OBJECTIVES: A combination of two innovative technologies is proposed to demonstrate the remediation of contaminated groundwater at the McClellan AFB site. The proposed demonstration will combine the groundwater withdrawal technology of horizontal wells with the treatment technology of pulsed ultraviolet (UV) to remediate the contaminated groundwater.

APPROACH: The Davis site is a radio-tracking station located in Davis, California, approximately 12 miles from Sacramento. The groundwater beneath the facility consists of multiple saturated layers, the first three of which are contaminated with low levels (50 to 500 ppb) of trichloroethane and tetrachloroethane. The contaminated units exhibit bidirectional groundwater flow based on local irrigation uses. This seasonal shift of flow direction impedes the migration of contamination from the site. These features underscore the suitability of the Davis site for this integrated technology demonstration.

The demonstration is planned to proceed in two steps to minimize cost and to optimize effectiveness. The first step will be a test of the treatment method using an existing reactor at the Davis site. The data from this test will provide implementation and design data for the full-scale treatment and withdrawal system. The second step will be installation of the horizontal well and the full-scale treatment of the contaminated groundwater. The Department of Energy (DOE) Office of Technology Development (OTD), will assist McClellan AFB with Strategic Environmental Research and Development Program (SERDP) funding to transfer the horizontal well technology from the DOE Savannah River Site to McClellan and cooperate in conducting the overall project.

BENEFITS: The withdrawal technology proposed for this demonstration is the use of horizontal withdrawal wells to remove contaminated groundwater from beneath the facility. The use of horizontal wells is favorable for the Davis site, given the plume geometry. Their use will also act as a technology transfer to the Air Force.

The pulsed UV treatment uses deep band UV light to effectively destroy chlorinated solvents and the daughter products of those solvents by destroying the chlorine bonds. This technology has shown substantial success in laboratory tests where pulsed UV treatment has achieved order-of-magnitude reductions of contaminants in groundwater in both batch and flow-through tests. Another version of this technology has been field tested at the Lawrence Livermore National Laboratory on a broad range of organic contaminants in high concentrations. This demonstration will focus on low concentrations of solvents in groundwater using a more cost-effective, pulsed UV method.

PARTNERS AND RELATED ACTIVITIES: The DOE-OTD will cooperate with the Air Force in conducting the remediation demonstration. The horizontal well technology developed by DOE has been licensed to several private firms, and it is expected that the drilling will be accomplished with private industry involvement.

The information this demonstration is planned to be used in support of future Department of Energy and Department of Defense remediation efforts.

MILESTONES:

Pilot treatment demonstration completed	FY92
Design and initiate procurement of horizontal well/pulsed UV treatment systems	FY93
Complete field demonstration	FY93

MILESTONES: (Continued)

Complete project report on demonstration and transfer system to full scale remediation FY94

FUNDING:

FY 1992 $1.1M

RESEARCH ACTIVITY:

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RESEARCH TITLE: HALON 1301 AVIATION SYSTEM REPLACEMENT

OBJECTIVE: Fire and explosion suppression agents used on military aircraft require strict performance criteria that demand lightweight, clean, nontoxic, and high performance qualities in suppression and dispersal. These agents are used in aircraft fuel tanks, surrounding compartments (dry bays) and engine nacelles for protection against peacetime and combat threats. Halon 1301 has been found in the past as the only feasible agent that meets these criteria sufficiently. Halon 1301 systems are currently installed in almost all military aircraft. However, Halon 1301 is a strong ozone depleter and will be phased out under the Montreal Protocol by FY2000. This program would screen candidate agents to replace Halon 1301 and test the best candidates in the dry bay and engine nacelle applications.

APPROACH: The program will begin by determining the requirements the Halon replacement must meet in the areas of fire suppression capability, corrosivity, conductivity, material compatibility, shelf life, and toxicity. These requirements must be developed since standard design practice has been to use Halon 1301, so specific requirements have not been established. Controlled studies and test evaluating agent dispersion and transport characteristics will be performed, followed by full-scale testing. The best 2 to 3 candidate agents will proceed to comprehensive testing. Candidate agents will be evaluated for compatibility with existing hardware, corrosiveness, electrical conductivity, combustion by-products and their resulting effects, and issues related to logistics and support ability. Toxicity studies will be performed as part of this effort. Renovation of Air Force unique test facilities to support the performance testing will also be required under this program. The final phase of the program will be to produce the necessary design criteria and equations to adequately design systems (both current and future) to successfully use the selected agent(s) in applications.

BENEFITS: A recent ASD study has shown a savings of $760 million in USAF aircraft assets due to fire loss prevention from Halon 1301 systems over the last 14 years. This program is to provide a mission essential capability for fire protection with minimal system impact and proven substantial benefits in asset preservation due to fire loss.

PARTNERS AND RELATED ACTIVITIES: The Federal Aviation Administration is coordinating their requirements to this proposed program and will expand these results to include large cargo bay experiments and qualifications. Chemical companies are exploring the new market for CFC and Halon alternatives. This program will include support from the Naval Research Laboratory in agent screening and the National Institute of Standards and Technology. Suppression system manufacturers are performing limited tests to assess the impact of replacement agents on their systems.

MILESTONES:

Program start	Jan 92
Test facility renovation	Sep 92
Laboratory scale screening	Sep 93
Agent/systems compatibility	Sep 93
Toxicity, env. impact, supportability	Sep 94
Design criteria tests	Sep 95

FUNDING ($K):

FY92 300

RESEARCH ACTIVITY: WL/FIVS, J. Michael Bennett, DSN 785-6302

RESEARCH TITLE: e-SCRUB - THE APPLICATION OF DNA PULSED POWER TO ELECTRON SCRUBBING OF FLUE GAS TO REMOVE UNWANTED BY-PRODUCTS

OBJECTIVE: Utilizing electron beam dry scrubbing (EBDS), the objectives of this program are to demonstrate a cost effective approach for removing NO_x and air toxins from DoD incinerators and SO_2 and NO_2 from coal fired boilers. This program will also provide technology transfer so that civilian utilities which use high sulfur content coal can continue to do so and still comply with the Clean Air Act Amendment (CAAA) of 1990. Thus, this program will avoid the devasting economic impact of the CAAA on producers of high sulfur content coal.

APPROACH: The Defense Nuclear Agency has supported pulsed power research for nuclear weapons effects simulation (NWES) for many years. This research has presented DNA with an opportunity to integrate this electron beam technology into EBDS, to provide an affordable electron beam dry scrubbing of stack gases. Over the past twenty years, EBDS has demonstrated the efficient removal of SO_2 and NO_x from the stack gas of coal-fired facilities and NO_x and air toxins from the flue gas of incinerators. The DoD is mandated by the CAAA of 1990 to reduce emissions from its incinerators of NO_x and air toxins: these pollutants contribute significantly to the smog problems in urban areas. In addition, coal-fired facilities contribute significantly to acid rain and other air pollution problems through emission of SO_2 and NO_x. This problem is common to DoD coal fired facilities, and many commercial facilities. Furthermore, civilian utilities in the eastern United States which rely on high sulfur coal mined in the Appalachian area will also be severely affected by the CAAA 1990, which mandates significant reduction of both SO_2 and NO_x emission for existing plants and new construction.

Until now conventional electron beam generators have been too expensive for cost effective application of EBDS. However, in support of NWES, the Balanced Technology Initiative (BTI) and the Strategic Defense Initiative Office (SDIO), DNA has developed the high power transformer accelerator (HPTA), electron beam generator. This can satisfy the power, size and cost requirements for an EBDS process affordable by the utilities and Dod boilers burning high sulfur coal and incinerators burning municipal solid waste (MSW).

Specifically, using the HPTA technology, DNA will develop a high power, continuously pulsed electron beam generator; the major elements and support subsystems are:

(1) Slow power condition system, which includes main power supply, command resonance charge unit and thyratron switched unit;

(2) Saturable reactor modulator, which includes saturable reactor units, pulse forming lines, output lines, and reset circuits;

(3) High Power Transformer Accelerator which includes the cells, HPTA support structure, cathode stalk and its support structure;

(4) Electron Gun (E-Gun) which include thermionic-cathode support structure, thermionic cathode, grids, grid driver, foil and foil support structure;

(5) Instrumentation Command and Control (IC^2) which includes all diagnostics, safety interlocks and operation;

(6) Auxiliaries which include oil, water, and vacuum subsystems; heat exchangers; flowing gas load which includes duct-work, dryers and blowers; and facility modifications such as prime power, conduits, storage tanks and thermal management.

In addition, DNA will derive an optimum layout of an EBDS treatment facility utilizing HPTA for the electron

gun.

BENEFITS: The DoD is mandated by the CAAA 1990 to significantly reduce the emissions of air toxins and NO_x from its incinerators, especially those within high smog urban zones or those that can effect these through air motion. A cost effective EBDS (made so through the application of DNA's HPTA electron beam generator technology) would simultaneously remove both of these pollutants. Furthermore, there is now a unique opportunity to transfer defense technologies conceived for use in SDI, BIT, and NWES to the civilian economy to address severe national environmental and economic concerns. With EBDS, a critical national environmental goal mandated by the CAAA 1990 can be met without a devastating economic impact on the coal industry and the users of high sulfur coal. The Defense Nuclear Agency believes that this transfer of defense technology is a very valuable addition to the overall Strategic Environmental Research and Development Program.

In addition, the advent of low cost gun technology will allow the cost effective application of e-SCRUB up to 28 DoD coal fired facilities (in the range 10 to 45 MWe), removing ~95 percent of total SO_2 and ~70 percent of total NO_x from each plant. This represents ~47 percent reduction of the total emissions by treating just 21 percent of the total (131) DoD coal fired facilities.

Finally, the development of a compact, high power, high efficiency, continuously-pulsed power system will facilitate a wide spectrum of advanced weapon system developments such as:

(1) Electronic jamming systems
(2) Electronic mine clearing devices
(3) Directed energy weapons such as high energy lasers and high power microwave sources

PARTNERS AND RELATED ACTIVITIES: The Defense Nuclear Agency will collaborate with the Karlsruhe Nuclear Research Center (KFK), which has an active program in the EBDS program with KFK. Karlsruhe Nuclear Research Center will apply the two-step irradiation process and moving gravel bed filter developed by KFK to the high sulfur content coal and moderate de-NO_x (70 to 80 percent removal efficiency) conditions appropriate to the East Coast of the United States. In addition they will apply the EBDS process to the high deNO_x and deSO_x, low deSO_x and high HCL levels typical of DoD incinerators burning municipal solid waste (MSP). The Defense Nuclear Agency will also collaborate with the University of West Virginia, which has an active program in the clean coal technology. They will assist in the analysis of EBDS for incinerators and utilities, along economic analysis of the by-product (fertilizer) value.

MILESTONES: During FY 92, DNA will perform an integrated test of these HPTA subsystems:

-	Average Power	0.5 MW
-	Run Time	10 Minutes
-	Beam Kinetic Energy	800 keV
-	Beam Current	6 kA
-	Load	Flowing Gas

Also during FY 92, DNA will task KFK to document EBDS under conditions simulating high sulfur east coast coal and DoD incinerators burning municipal solid waste. Both the KFK II AGATE II Test Facility and kinetic reaction computer models will be applied.

FUNDING ($M):

FY 92 $6.0

RESEARCH ACTIVITY:

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PROJECT: WINDFARM FOR MILITARY INSTALLATIONS (Additional Funding)

OBJECTIVE: The primary objective of this project is to demonstrate the cost and operational benefits of powering grid connected U.S. military facilities in high wind areas with state-of-the-art wind turbines.

APPROACH: Commercial wind turbines (windfarm of 1 MW or greater) will be purchased, adapted for military application at a selected location with a high wind resource, installed, and operated. In addition, DOD personnel will receive O&M training and participate in the development of test plans for the installation. The project will be managed by the National Renewable Energy Laboratory (NREL) with wind resource assessment and siting support from the Pacific Northwest Laboratory (PNL). NREL and PNL will work closely with the engineering staff of the selected DOD facility to develop procurement plans based on the facility's needs. Testing will be conducted for a period of at least one year.

BENEFITS: The primary benefit to the DOD facilities will be the reduced consumption of nonrenewable fossil fuels for electrical power generation. In addition to cost savings, the use of state-of-the-art wind turbines will result in an alternate energy source that will serve to increase base security by providing a backup power source and increasing reliability while decreasing the reliance on vulnerable primary power sources. Larger scale windfarms have the potential to save 100s of millions of dollars in reduced fuel and logistic costs over the lifetime of the wind turbines. There are several manufacturers of highly reliable wind systems now reporting greater than 95% availability with routine maintenance, and over 16,000 wind turbines currently installed in the U.S. providing about 1600 MW of bulk power to electric utilities. This project will serve to open related military applications.

PARTNERS AND RELATED ACTIVITIES: Similar work has been proposed for utility service areas in the Federal Wind Program and should be mutually beneficial. Partners in this work will include the wind energy industry, DOE National laboratories, and DOD (U.S. Army CERL).

MILESTONES: Project will be completed by the end of FY 1992.

FUNDING:

FY 1992	$1.4M (National laboratories/industry)

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